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Case Report

Proximal fibula resection with tibial stabilization: a surgical challenge of proximal fibular tumors

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ABSTRACT

Primary fibular bone tumors are rare, representing 2.5–4% of all. Most occur in the proximal third and are benign, however their proximity to neurovascular and ligament structures may cause morbidity period. Surgical management is challenging, requiring careful dissection and reconstruction to preserve knee stability and function. Three proximal fibular tumors were resected *en bloc* with neurovascular preservation. The lateral collateral ligament and biceps femoris tendon were reattached to the proximal tibia using anchors. Minimum follow-up was 12 months. Functional outcomes were assessed with the musculoskeletal tumor society score (MSTS) score. All patients underwent successful resection with preservation of common peroneal nerve and key stabilizing structures. Anchor-based reconstruction provided good knee stability. No recurrence occurred. Transient peroneal nerve (CPE) deficits occurred in two patients, with full recovery. MSTS scores ranged from 83.3% to 93.3%. Proximal fibular resections are technically challenging due to anatomical complexity and close relationship with CPE. Larger resections increase the risk of CPE palsy, highlighting the need for meticulous planning and careful nerve handling. Although the need of lateral collateral ligament reconstruction is debated, reattachment using tibial anchors provided stable knees and good function in all cases. With proper technique, both oncological control and excellent functional outcomes are achievable.

Keywords: Proximal fibular tumors, Giant cell tumor, Ewing sarcoma, Aneurismal bone cyst, Knee reconstruction

INTRODUCTION

Primary bone tumors of the fibula are rare, representing approximately 2.5-4% of all primary bone tumors, with around 20% of these being malignant.[1,2]

Most of fibular tumors occur in the proximal third of the bone and are predominantly benign, with osteochondromas, giant cell tumors (GCT), chondrosarcomas and aneurysmal bone cysts (ABC) being the most common types.[3] Although the majority of proximal fibular tumors are benign, they can still cause significant morbidity.[2,4]

Patients with fibular tumors typically present with a palpable mass and local pain. Additional findings, such as elevated skin temperature and peroneal nerve compression may suggest local aggressiveness. Clinical and imaging evaluation are essential for diagnosis. When malignancy is suspected, biopsy should be considered.[2]

Proximal fibular tumors present particular clinical challenges because of their proximity to critical neurovascular and musculoskeletal structures. Although the fibula is a non-weight-bearing bone, it contributes to stability of both ankle and knee. Surgical management is complex due to the intricate regional anatomy, including the common peroneal nerve, lateral collateral ligament and biceps femoris tendon. Resection in this area therefore requires meticulous surgical planning to minimize functional impairment.[1,5,6]

Most patients with symptomatic benign tumors or malignant tumors of the proximal fibula require surgical treatment. For benign lesions, intralesional curettage with filling is often sufficient. Nevertheless, locally aggressive benign tumors in this particular location, as GCT and ABC, frequently require resection for appropriate local control. In contrast, malignant tumors always require *en bloc* wide resection with a more extensive surgical approach.[2,7,8] Following surgical resection, reconstruction is necessary to preserve limb function.

All patients were informed that data concerning the case would be submitted for publication and they provided consent.

CASE REPORT

In this report, we present three cases of proximal fibular tumors surgically treated with proximal fibula resection, preserving the neurovascular structures and reconstruction of lateral collateral ligament and biceps femoris tendon on the proximal tibia metaphysis. Patients were followed for a minimum of 12 months.

A functional scale assessment was also performed using musculoskeletal tumor society score (MSTS).

Case 1

A 67-year-old female patient presented with constant left knee pain, occasionally radiating down the leg. Radiography revealed a lytic lesion in the fibular head (Figure 1). Computed tomography (CT)-scan and magnetic resonance imaging (MRI) confirmed a large lytic lesion with sclerotic borders, calcifications and partial interruption of the anteromedial cortical of the fibular head. CT scan-guided biopsy was compatible with an atypical cartilaginous tumor. No other lesions were identified.

Surgical treatment was performed through an external approach, with identification and isolation of the common peroneal nerve (CPE) and its branches, lateral collateral ligament (LCL), popliteofibular ligament (PFL) and biceps femoris tendon. En-bloc resection of 5.5cm of the proximal fibula was performed (Figure 1), preserving all major surrounding structures.

The LCL, PFL and biceps femoris tendon were all reinserted on proximal tibia metaphysis with PEEK® anchors (Figure 2), adjusted to the appropriate tension at 30º knee flexion. The knee was then immobilized at 30º flexion with an orthosis.

Histopathological analysis confirmed an atypical cartilaginous tumor with free margins. Postoperatively, the patient was pain-free and has no signs of CPE palsy. After proper rehabilitation, she achieved a range of motion 0-120º, with no knee instability, full weight-bearing capacity and return to daily activities.

At three-year follow-up, the patient remains asymptomatic and MRI showed proper integration of the anchors and tendons at proximal tibia, no inflammation and no signs of recurrence or reconstruction failure. On functional scales, the patient scored 83.3% on the MTST score, with contribution of her degenerative osteoarticular disease especially spondylarthrosis and discopathy.

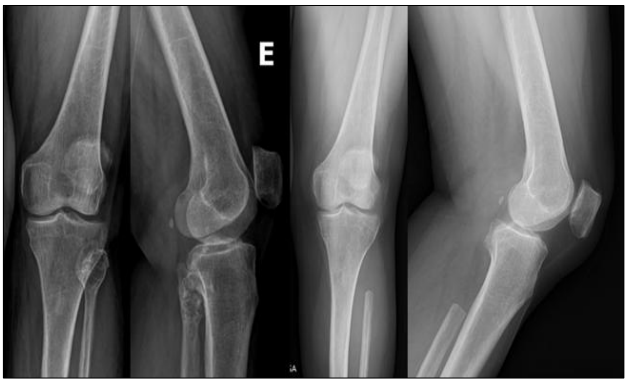

Figure 1: Lytic lesion of proximal fibula and post-operative X-ray after *en-bloc* resection.

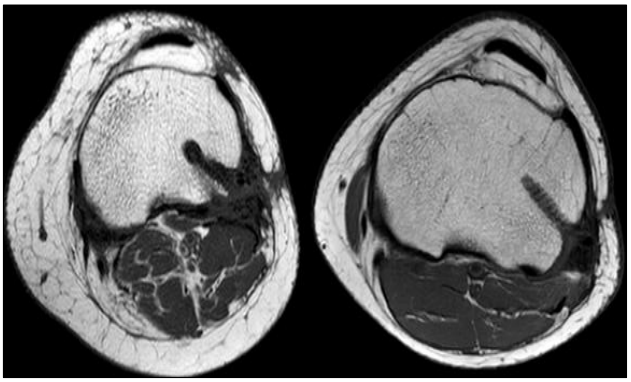

Figure 2: Anchors at proximal tibia after resection from case 1 and 2.

Case 2

An 18-year-old male had previously been diagnosed with an aneurysmal bone cyst (ABC) of the fibular head, based on MRI and biopsy findings. The lesion was initially treated intralesional with curettage, drilling, phenolization and cementing. Histology confirmed a secondary ABC associated with a giant cell tumor (GCT).

At two-year follow-up, local recurrence was detected (Figure 3). MRI demonstrated a huge posterolateral lesion extending from the fibular head, compromising muscles and knee function. Biopsy confirmed a GCT.

The patient underwent proximal fibula resection of 8.5 cm (Figure 3), with stabilization at proximal tibia using a PEEK® anchor at 30º knee flexion for reinsertion of the LCL and biceps femoris tendon (Figure 2), followed by immobilization in an orthosis. All major anatomical

structures were identified and preserved. The CPE, although intact, required careful manipulation and retraction due to tumor's large size. Postoperatively, the patient presented CPE paresthesia and motor deficits immediately after surgery compatible with neuropraxia.

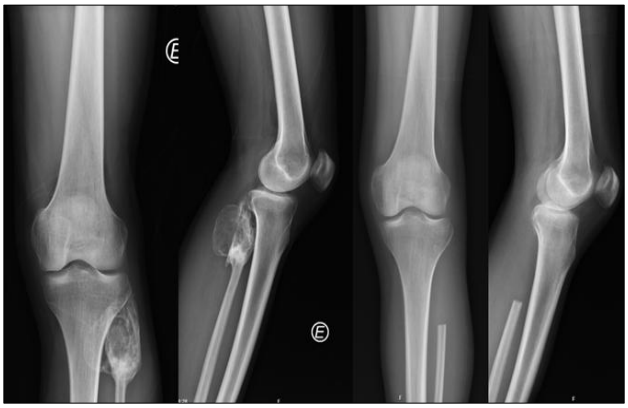

Figure 3: Local recurrence of giant cell tumor and post-operative X-ray after proximal fibula resection.

Histology confirmed GCT and free margins. The patient fully recovered from CPE palsy 3 weeks after surgery, although external support was still needed for weight-bearing due to muscles impairment of surgical approach. After completing the rehabilitation protocol, at six months evaluation the patient presented full knee range of motion and was able to fully weight-bear without support, and completely returned to activities. Follow-up MRI at 2 years showed no tumor recurrence and stable anchor positioning.

The patient obtained an MSTS functional score of 93.3% at 24 months of follow-up.

Case 3

A 36-year-old male presented with several months of knee pain and a palpable mass on lateral aspect of proximal leg. Imaging revealed a large, locally aggressive tumor in fibular diaphysis (Figure 4). CT-guided biopsy disclosed Ewing sarcoma. Following appropriate staging, patient began neoadjuvant chemotherapy. Six months later, MRI re-evaluation showed partial response with areas of intratumoral necrosis.

The patient subsequently underwent wide tumor excision (20 cm) (Figure 4). All major adjacent structures, including CPE were identified and preserved, as the tumor did not invade fibula head. The CPE neurolysis was very extensive due to the larger fibula resection, including its bifurcation and ramus. LCL and biceps femoris tendon were reinserted into the proximal tibial metaphysis with 2 PEEK® anchors at 30º knee flexion.

Postoperatively, patient presented CPE paresthesia and motor deficits, with difficulty in ankle and toe dorsiflexion.

The pathology report confirmed Ewing sarcoma with free margins and a favorable response to systemic therapy (>95% tumoral necrosis). The patient started rehabilitation and completed the adjuvant systemic treatment.

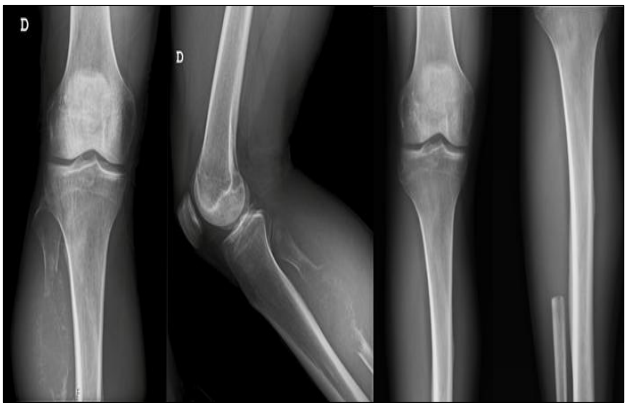

Figure 4: Ewing sarcoma of proximal fibular and post-operative X-ray after wide resection of proximal fibula.

At three months postoperatively, paresthesia had resolved and dorsiflexion strength was 4/5. He was able to bear full of weight-bear without knee pain, although running was still limited. Six-month follow-up MRI showed no local recurrence and stable anchor fixation (Figure 5). At 1 year-follow-up, the patient completed rehabilitation with a very good muscle balance and reinforcement, presents no neurological deficits and only residual distal deficits in proprioception associated to the resected muscles with the tumor, although the extremely good compensation.

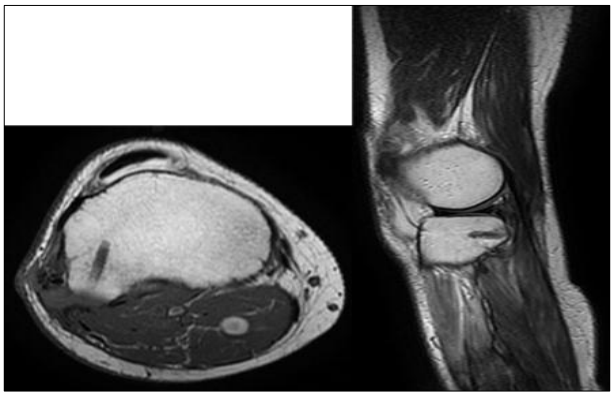

Figure 5: Anchor at proximal tibia from case 3.

DISCUSSION

Bone tumors of fibula are uncommon and their surgical management is particularly challenging due to the complex local anatomy, including major neurovascular structures and tendon insertions. Whenever possible, surgical treatment should aim to preserve the CPE, tibiofibular ligaments and lateral knee ligaments to prevent foot drop, sensory and motor deficits, and knee instability.[6,9,10]

In case 2, an intralesional approach was initially attempted, as it is a safe option for such benign lesions.[2,11] Polidocanol for sclerotherapy was not considered in this ABC due to location, associated risks and its large size, expansion and cortical thinning. After recurrence, local aggressiveness was evident, invading soft tissue posterolateral and compromising muscles and knee function. Neoadjuvant denosumab for the local recurrence of this GCT was not an option as the tumor was well defined and resectable at the time. The high risks and no oncological control associated to repeated intralesional treatment also made it not an option. Furthermore, in this location literature shows that for cases of malignant tumors, locally aggressive or recurrence, resection is often required.[6,11]

In our series, the multidisciplinary team decided for wide resection in all three cases to achieve oncological control and reduce recurrence risk. Despite the technical challenges, all major structures were preserved, particularly the CPE, which is crucial for maintaining limb function.

The proximity of CPE and the need for accurate ligament and tendon reconstruction make proximal fibular resection a technically demanding procedure. Resection inevitably compromises knee stability due to the loss of the LCL distal insertion. The need for LCL reconstruction after tumor excision remains controversial, as other stabilizing structures - such as the cruciate ligaments – remain intact. Some authors report satisfactory functional outcomes even without LCL reconstruction.[12] In our cases, we decided to stabilize the lateral knee by reattaching the LCL and biceps femoris tendon to the proximal tibial metaphysis using anchors. With appropriate rehabilitation, all patients achieved full weight-bearing capacity and ROM, without knee instability. All patients achieved excellent scores on MSTS. This technique has already showed good outcomes in previous series of cases with reports up to 97% on MSTS score.[9,11,13,14]

Another common complication of proximal fibular resection is CPE palsy, with reported nerve injury rates ranging from 3% to 20%.[15] Intraoperative neuromonitoring can help reduce this risk by providing real-time feedback, allowing corrective actions that may prevent nerve damage.[15] In our series, two out three patients reported CPE injury immediately after surgery. Fortunately, one recovered completely within a very short period and the other one after a few months. Most of these palsies are temporary and typically recover within the first year.[11] Larger proximal fibula resections carry higher risk for CPE palsy, as the second and third patients (resected 8.5 cm and 20 cm, respectively).

Despite the risks, favorable functional outcomes can be achieved following proximal fibular resection, particularly when CPE is preserved. Patients with intact nerve function tend to have better functional outcomes scores and reduced knee instability.[12,16,17]

CONCLUSION

Although rare, proximal fibular tumors require careful surgical planning and execution. Resection of the proximal fibula carries inherent risks, especially CPE palsy when larger resections above 8 cm. However, with a good preoperative planning and appropriate reconstructive techniques, both oncological control and good functional outcomes are achievable. Proximal tibial anchors showed to be an effective reconstruction technique allowing very good function and knee stability.

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REFERENCES

1. Angelini A, Bohacek I, Plecko M, Biz C, Trovarelli G, Cerchiaro M, et al. Reconstructive surgery after distal fibular resection due to bone tumors: a technical report on surgical strategies and results from the PROSPERO international register of systematic reviews. EFORT Open Rev. 2024;9(6):503-16.
2. Sun T, Wang L, Guo C, Zhang G, Hu W. Symptoms and signs associated with benign and malignant proximal fibular tumors: a clinicopathological analysis of 52 cases. World J Surg Oncol. 2017;15(1):92.
3. Zeytoonjian T, Mankin HJ, Gebhardt MC, Hornicek FJ. Distal lower extremity sarcomas: frequency of occurrence and patient survival rate. Foot Ankle Int. 2004;25(5):325-30.
4. Hansford BG, Smith ZC, Stacy GS. Imaging of Benign Fibular Tumours and Their Mimics. Can Assoc Radiol J. 2018;69(3):293-302.
5. El Ghoneimy A, Zaky I, Zamzam M, Kamel A, Mounir N, El Kenaey N. Wide Resection of Primary Malignant Bone Tumors of the Hand in Children and Reconstruction Using Nonvascularized Fibular Bone Graft: Case Series and Literature Review. J Hand Surg Am. 2022;47(10):1017.e1-e7.
6. Muslu O, Cengiz T, Aydın Şimşek Ş, Ersoy A, Albayrak B, Coşkun HS, et al. Osteosarcoma of the Proximal Fibula: A Case Report and Review of the Literature. Cureus. 2023;15(4):e38195.
7. Perisano C, Marzetti E, Spinelli MS, Graci C, Fabbriciani C, Maffulli N, et al. Clinical management and surgical treatment of distal fibular tumours: a case series and review of the literature. Int Orthop. 2012;36(9):1907-13.
8. Hong H. Clinical Treatment of Distal Fibular Tumors in Children. 2015;05(03):171-6.
9. Bickels J, Kollender Y, Pritsch T, Meller I, Malawer MM. Knee stability after resection of the proximal fibula. Clin Orthop Relat Res. 2007;454:198-201.
10. Leddy LR, Holmes RE. Chondrosarcoma of bone. Cancer Treat Res. 2014;162:117-30.

11. Abdel MP, Papagelopoulos PJ, Morrey ME, Wenger DE, Rose PS, Sim FH. Surgical management of 121 benign proximal fibula tumors. Clin Orthop Relat Res. 2010;468(11):3056-62.
12. Inatani H, Yamamoto N, Hayashi K, Kimura H, Takeuchi A, Miwa S, et al. Surgical management of proximal fibular tumors: A report of 12 cases. J Bone Oncol. 2016;5(4):163-6.
13. Faezypour H, Davis AM, Griffin AM, Bell RS. Giant cell tumor of the proximal fibula: surgical management. J Surg Oncol. 1996;61(1):34-7.
14. Inatani H, Yamamoto N, Hayashi K, Kimura H, Takeuchi A, Miwa S, et al. Surgical management of proximal fibular tumors: A report of 12 cases. J Bone Oncol. 2016;5(4):163-6.
15. Thacker MM, Pargas C, Marky C, Rogers KJ, DiNardo AA, Sestokas AK. Neuromonitoring for Proximal Fibular Osteochondroma Excision. J Pediatr Orthop. 2022;42(6):e667-73.
16. Atalay I. Surgical management of primary malignant proximal fibular tumors: Functional and clinical outcomes of 23 patients. Joint Dis Related Surg 2019;30(1):24-31.
17. Hilton T, Wiese KR, Hosking KV, Hoffman EB. Proximal fibular resections for primary bone tumors: oncological and functional results of a case series. SA Orthop J. 2019;18(2):44-8.

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